

HYPERTENSION eHEALTH INTERVENTION NATIONAL UPSCALING

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Hypertension is a main risk factor worldwide for premature death. After having conducted several hypertension eHealth interventions locally, we now study national upscaling. Innovation diffusion is generally challenging; there are additional challenges in eHealth and even more so for prevention interventions. Still, the Dutch GLI-system (Combined Lifestyle Intervention) appears promising for enabling national innovation diffusion. The local 'Blood Pressure Challenge' intervention has been redesigned to a 'Blood Pressure GLI'-format. This new service concept is evaluated using Rogers' framework of innovation diffusion in a user study with $n=7$ potential adoption partners (physiotherapists, dietitians and lifestyle coaches) having GLI execution experience. Main findings are that the Dutch GLI-system appears supportive for innovation diffusion and that the respondents see clear benefits in the Blood Pressure GLI service concept and its tangible blood pressure improvements. Finally, the user feedback suggested several service redesign improvements.

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1 Introduction to the research question

Hypertension is the main risk factor for death worldwide, according to Lancet publications from the largest health study ever (Lozano, 2012, Lim, 2012). Still, most people lack the health self-management competences to improve their blood pressure. Which is why most people get hypertension before they retire (Ostchega, 2020, Zhou, 2021, Carey & Whelton, 2020). Hence, we previously developed and tested a 'Blood Pressure Challenge,' an eHealth intervention using various tools and daily microlearning strategies to strongly reduce blood pressure (avg. -20/-10 systolic/diastolic) within several weeks (Simons et al., 2022, 2024, 2025, 2026).

After more than 10 employer/employee groups and four community pilots in Leiden and Rotterdam, the next question came up: how can we upscale to a more national and structural level, as a follow up to this series of one-off local innovation projects? Also, several local health care partners (physiotherapists, dietitians and lifestyle coaches) started asking for options for their adoption, training and reimbursement for the Blood Pressure Challenge. Next, the idea came up to transform the challenge into a GLI format. The GLI (Combined Lifestyle Intervention) is a nationally regulated, evidence-based healthcare pathway in the Netherlands that is reimbursed through basic health insurance, incorporating 2-year-long lifestyle interventions for obesity and lifestyle-related diseases. There is a review board and procedure to assess if a lifestyle intervention meets requirements and becomes part of the GLI pathway. When an intervention is 'GLI-accredited' local practitioners can be trained and licensed, if they follow the standard and report their results in a national database.

Since the GLI admission procedure requires quite some investments in time, money and data collection, an evaluation study was conducted with potential adoption partners having GLI experience, on the Blood Pressure GLI design concept.

Our **Research Question:**

To which extent does the Dutch GLI-format help in national upscaling and what is the feasibility and attractiveness of the Blood Pressure GLI for potential adoption partners?

2 Theory and concepts

In this section we take two steps. First, we briefly review some of the challenges in innovation diffusion and of upscaling in health care, eHealth and prevention. Second, using Rogers' framework of innovation diffusion, we review some of the benefits of the Dutch GLI system for upscaling the Blood Pressure Challenge.

2.1 Upscaling challenges, in eHealth and prevention

Upscaling innovations toward market-wide adoption requires navigating the "chasm" between early adopters and the early majority (Moore, 2014). A primary challenge is managing innovation diffusion, where relative advantage and compatibility with existing user values determine the rate of spread (Rogers, 2003). Organizations often struggle with the Complexity-Consistency Paradox: maintaining core intervention fidelity while allowing for local adaptation and customization (Fixsen et al., 2009). Furthermore, scaling is frequently hindered by the lack of a "business model fit" in adopters and the inability to mobilize resources across varied contexts (Christensen et al., 2006; Teece, 2010). Success requires moving beyond "island solutions" toward systemic integration within the broader market infrastructure (West & Bogers, 2014).

In the *healthcare and eHealth* sectors, upscaling is uniquely constrained by institutional complexity and fragmented reimbursement systems (Greenhalgh et al., 2017). Innovations often fail to move beyond the pilot phase—a phenomenon known as "pilotitis"—due to a lack of alignment with clinical workflows and professional identities (May et al., 2009, Egermark et al., 2022). The NASSS framework (Nonadoption, Abandonment, Scale-up, Spread, and Sustainability) highlights that challenges arise from the interplay of multiple domains: the health condition, technology, value proposition, and organizational capacity (Greenhalgh et al., 2017). Additionally, interoperability issues and stringent regulatory requirements (e.g. data privacy, execution protocols or reimbursement rules) create significant barriers to national expansion (Adler-Milstein et al., 2021; Cresswell & Sheikh, 2013). Consequently, sustainable scaling necessitates a co-evolution of technology, health practices, and policy (Lennon et al., 2017).

Upscaling *prevention and healthy lifestyle interventions* faces a "prevention paradox," where long-term health gains often conflict with short-term clinical funding models. A primary challenge is the low intensity of lifestyle support in traditional medical workflows, often marginalized in favor of acute care (Fineberg, 2013). Structural success is often hindered by the lack of intersectoral collaboration between healthcare and community-based services (Mair et al., 2012, Ockene et al., 2011). Consequently, scaling requires moving beyond individual behavior change toward "whole-system" approaches that address environmental determinants (Skivington et al., 2021; Giunca et al., 2025).

2.2 Rogers' framework of innovation diffusion & Blood Pressure GLI

Table 1: Summary of GLI system benefits for practitioners of the Blood Pressure GLI service concept, based on Rogers' innovation diffusion factors

Diffusion Factor	Blood Pressure GLI
Attractiveness	Professional legitimacy and structural health care system payments for practitioners
Alignment	Systemic compatibility: integrated into existing routines
Simplicity	Low "setup" effort: using existing GLI ways of working incl. billing and referral relations
Observability	Clear intervention results. Blood pressure as motivating biofeedback. National monitoring systems.
Trialability	Blood Pressure GLI processes easy to imagine & experience by shadowing in ongoing groups

The transition of the Blood Pressure Challenge from a pilot initiative to an accredited GLI represents a strategic shift toward systemic scaling, which can be elucidated through the lens of Rogers' Diffusion of Innovations theory. While NASSS (Greenhalgh et al., 2017) offers a deeper look at systemic complexity, Rogers' framework was selected for its robust ability to evaluate the perceived attributes of the intervention among existing GLI practitioners, which is a primary driver of initial national uptake. Rogers (2003) posits that the adoption rate of an innovation is predominantly governed by five attributes: attractiveness (or relative advantage), alignment (or compatibility), simplicity (or low complexity), observability (or clarity of benefits), and trialability (including previews or shadowing in existing implementations). Table 1 summarizes the GLI system's benefits according to these factors, illustrating how its formalized healthcare infrastructure mitigates some of

the typical barriers associated with the "pilot" phase of medical interventions. Further explanation of Table 1 follows below.

Central to this transformation is the enhancement of *attractiveness* through professional and financial legitimacy. While the earlier Blood Pressure Challenge pilots relied primarily on clinical health outcomes to attract interest, the GLI framework provides structural reimbursement via basic health insurance, transforming the intervention from a entrepreneurial project into a standardized revenue stream for practitioners (Greenhalgh et al., 2017, Egermark et al., 2022). Furthermore, the system ensures *alignment* through systemic compatibility. Unlike pilot programs that often operate as administrative "add-ons," the GLI aligns with the existing working-, reporting- and billing routines of Dutch primary care. Since a nationwide network of over 1,200 providers is already proficient in similar GLI protocols, the Blood Pressure GLI becomes a more "plug-and-play" solution (Lennon et al., 2017).

Simplicity is enhanced (complexity is reduced) by utilizing pre-established referral and billing pathways, effectively removing the need for practitioners to construct their own operational infrastructure. This ease of implementation is coupled with *observability*, where the integration into national monitoring systems allows for the validation of results at a population health level, which enhances the existing blood pressure benefits (of using rapid results for coaching purposes) in comparison to most other GLI formats focusing on the more cumbersome metric of weight loss. Finally, regarding *trialability* it is easy to imagine for aspirant Blood Pressure GLI adopters to imagine how things will go, thanks to adoption of GLI protocols. Besides, it is relatively normal in the GLI system for aspirant GLI adopters to shadow (= watch along in one or more intervention sessions) with existing GLI groups, which enables a 'try before you buy' experience.

While Rogers identifies five drivers, scholars suggest adding customization to account for the necessary "reinvention" in complex health settings. Effective diffusion requires balancing intervention fidelity with local adaptation to satisfy diverse patient needs and organizational- or community contexts (Fixsen et al., 2009). This flexibility, often termed "reinvention" in implementation science, enhances long-term sustainability and ownership among practitioners (Greenhalgh et al., 2017). Furthermore, customization allows interventions to address socio-

cultural and health nuances of specific populations, thereby also reducing barriers for preventive health (Lorenc et al., 2013). Ultimately, providing practitioners with the agency to tailor non-core components accelerates adoption across heterogeneous healthcare landscapes (May et al., 2009). ***In summary, this provides an evaluation framework with six factors for our user evaluation*** with potential adoption partners, as further described in the next section.

3 Methods and materials

In a design research approach, we follow the methodology of Vaishnavi & Kuechler, (2004) which goes from problem awareness and solution suggestion to development, evaluation and conclusion. Previously, a tentative Blood Pressure GLI service concept was formulated, based on practitioner interactions. In this paper we focus on the first evaluation- and concept redesign phase. After reporting the user study evaluation results in section 4, we discuss redesign options in section 5.

The ***Blood Pressure Challenge phase with twice-daily biofeedback*** consists of¹:

- Telephone intake & instructions for BP (Blood Pressure) home measurements
- Start- and repeat surveys (BRAVO² behaviors and RAND-SF8)
- Group sessions (weeks 1, 2, 3, 6, 10, face-to-face)
- Daily eCoaching in week 1
- (at least three days, via MS Teams or face-to-face)
- Twice-daily BP measurements and logging email
- Feedback on group progress at repeat workshops
- Healthy recipe suggestions
- Content (portal and/or email) on health, BP, and behavior strategies

The updated ***2-year-long Blood Pressure GLI concept*** that we ***user-tested*** was:

- It scales the successful challenge phase, which achieved significant clinical and behavioral improvements:
 - Clinical Impact: Pilots yielded a 10% blood pressure reduction within weeks, effectively halving cardiovascular risks.

¹ This is a 10-week version for municipality-based challenges, providing an extension to employer-based versions.

² Bewegen, Roken, Alcohol, Voeding, Ontspanning = Exercise, Smoking, Alcohol, Foods, Relaxation.

- Health Behaviors (BRAVO survey): Participants demonstrated improved scores, specifically in physical activity, nutrition, and stress management.
- Well-being (RAND-SF8 survey): Statistically significant increases were recorded in both physical and mental health health-related quality of life.
- Satisfaction: High participant engagement resulted in group satisfaction scores ranging from 8.5 to 9 out of 10.
- Intake: Baseline survey and twice-daily BP self-monitoring.
- Year 1, Challenge phase: Group sessions (weeks 1, 2, 3, 6, 10, face-to-face)
- Daily eCoaching in week 1 (at least three days, via MS Teams or face-to-face)
- Year 1, Treatment phase: 5 workshops (months 3, 5, 7, 9, 11).
- Year 2, Maintenance phase: 6 Bi-monthly maintenance workshops.
- Year 1 & 2: four Biofeedback measurement weeks (BP logging twice-daily)
- Training for practitioners: 30 hours self-study, half-day workshop, test. Plus 1 or 2 half-day workshops per year as follow up training.
- Operations: Full ePortal support (content, group workflow management, surveys and BP measurements, eTools for health coaching)
- Practitioner support: communication-, education- and coach materials for recruitment and workshops, with room for practitioner inputs.
- Scaling and Efficiency: 4–6 groups of 12–18 participants annually, optimizing 65–80 hours per group.

Participants: From Jan 2026 to Feb 2026, the **user evaluation** was conducted with *n=7 local health care partners (2 physiotherapists, 2 dietitians and 3 lifestyle coaches) with previous GLI experience*. Since our purpose was a first design evaluation iteration and to ‘harvest’ design suggestions as soon as possible, we choose a sample size of seven. For this purpose, sometimes five participants can be enough (Virzi, 1992, Nielsen & Landauer 1993), but given some diversity in participant backgrounds, we chose seven. Next, three factors were important in selecting these participants. First, previous GLI experience was very useful for real-world assessments and for extracting design improvement suggestions from them. Second, current GLI execution rests on three professions (physiotherapists, dietitians and lifestyle coaches, with the latter being the majority), hence we chose a representation of 2, 2 and 3 respectively. Finally, we favored practitioners with Blood Pressure challenge experience, which counted for three of our participants.

In terms of evaluation process, first the Blood Pressure GLI concept was explained to them. Next, they were asked for feedback on each of the six innovation diffusion factors from theory: first a grade on a scale from 1 to 10, and then an explanation. Since this was not an evaluation with patients, but with health practitioners on a voluntary basis, no explicit ethics approval procedure was used. Still, all participants did provide explicit consent. The results of the user evaluation are described in the next section.

4 Results, evaluation from GLI practitioners

The results of the user evaluation, conducted among seven implementation partners including physiotherapists, dietitians, and lifestyle coaches with prior experience in GLI execution, provide critical insights into the innovation adoption and diffusion potential of the Blood Pressure GLI.

Table 2: Evaluation of Blood Pressure GLI concept by GLI practitioners (n=7)

Diffusion Factor	Blood Pressure GLI
Attractiveness	Scores: 8, 8, 1, 8.5, -- ³ , 8, 1 (Avg. 5.8) Fast, measurable results and daily feedback. Quote: "Blood pressure is a much better motivator than the scale."
Alignment	Scores: 8, 9, 3, 8, --, 5, 6 (Avg. 6.5) The proposed GLI formats integrate well into existing routines
Simplicity	Scores: 6, 8, 4, 8, --, 7, 7.5 (Avg. 6.8) The concept and training are seen as realistic. Clear structure and support from the licensor are crucial. Recruitment efficiency is crucial to avoid waiting list drop-outs.
Observability	Scores: 7, 7, 3, 7, --, 7.5, 8 (Avg. 6.6) Clear results. Blood pressure focus and biofeedback provide unique GLI value. And: "A more extensive product flyer would help me for clarity."
Trialability	Scores: 8, 9, 3, 9, --, 10, 8.5 (Avg. 7.9) Strong desire to 'shadow' groups & experience a Blood Pressure GLI in practice.
Customization	Scores: 8, 8, 3, 8.5, --, 7.5, 9 (Avg. 7.3) While valuing support with default materials, all partners express a wish to add their "own flavor" to a lifestyle intervention.

As summarized in user evaluation Table 2 below, the intervention was assessed across six diffusion factors, yielding average scores ranging from 5.8 to 7.9. Across respondents there is large variation in scores. The third respondent had outsourced

³ As explained, one respondent gave only qualitative feedback and no scores.

all GLI activity to an external partner, given the “incompatibility with our large-scale physiotherapy processes” and financial unattractiveness for them; resulting in low scores on all factors. The fifth respondent gave no scores, because she had ceased doing GLI’s, although she still provided this user evaluation with useful inputs on GLI operations and context alignment. The seventh respondent recently shifted to coaching on ‘who you are’ instead of ‘what to do’. Hence the attractiveness of the Blood Pressure GLI for her practice was seen as low (score 1). In contrast with these three respondents, evaluation scores of the other respondents were relatively high.

The qualitative feedback indicates that the intervention's *attractiveness* is significantly bolstered by its reliance on concrete, biometric results. Respondents noted that the "powerful feedback loop" provided by daily blood pressure monitoring serves as a superior motivator compared to traditional weight-centric programs, which participants often find emotionally taxing. One respondent familiar with the BP Challenge notes that Blood Pressure coaching provides more ‘substance’ than an average GLI, more health education and more measurement feedback (RAND SF-8 and BRAVO behaviors, besides blood pressure). The *observability* of benefits (= rapid blood pressure improvements in daily measurements) is perceived as a unique selling point that facilitates both client engagement and professional satisfaction. Other observable benefits mentioned are the clear business case and service concept, although some indicated that they would value a more extensive product description or -flyer.

Regarding *alignment* and *simplicity*, practitioners identified that the Blood Pressure GLI integrates effectively into their existing clinical "GLI factories," provided that systemic barriers such as administrative complexity and mandatory fees to intermediate organizations are minimized. The proposed training and structural framework were deemed realistic, yet the participants emphasized that the simplicity of execution is dependent on a user-friendly digital portal with BP monitoring and the ability to fill groups quickly to prevent dropout during waiting periods.

The highest evaluation scores were observed in *trialability* (7.9) and *customization* (7.3). There is a significant desire for "trialability" through shadowing existing groups and sessions to build implementation confidence. Furthermore, the results highlight a crucial tension in implementation science: while practitioners highly value

standardized foundational materials, they require the agency for customization. They expressed a consistent need to add a "personal flavor" to the intervention, allowing flexibility to address emergent group needs such as emotional eating or supplemental exercise, provided this customization aids rather than compromises overall quality.

Additional user feedback on Blood Pressure GLI concept and upscaling

Beyond the primary diffusion factors, the user evaluation yielded several critical insights regarding the long-term sustainability and operational viability of the Blood Pressure GLI. A primary concern identified by participating practitioners involves longitudinal *client retention*, particularly during the maintenance phase of the second year. The initially proposed structure of six sessions in year two is perceived as insufficient to prevent attrition. Based on their experience, they recommend enhancing continuous engagement through digital communication platforms, such as moderated WhatsApp groups, or providing supplemental group-based physical activities to maintain a consistent connection with clients.

Regional collaboration also emerged as a fundamental trait in upscaling. Practitioners emphasized that physical *outreach to general practitioners* and practice nurses, supported by communication materials and partnerships with national organizations like the Heart Foundation, is essential for *generating awareness and high-quality client referrals*. They note that low-quality client referrals create extra work and large drop-out rates, essentially sabotaging feasibility in terms of business case and quality of care.

In summary, the respondents recognized a clear opportunity for the Blood Pressure GLI concept. They also indicated that upscaling success depends on optimizing recruitment efficiency and implementing robust retention strategies throughout the full two-year duration.

5 Discussion and Conclusion

In answer to our Research Question (*To which extent does the Dutch GLI-format help in national upscaling and what is the feasibility and attractiveness of the Blood Pressure GLI for potential adoption partners?*) and based on Rogers' framework and the user study, we find: in addition to the GLI system benefits identified in the Theory and Concepts section (see Table 1), potential adoption practitioners with GLI experience indicate

that the Blood Pressure GLI service concept is attractive and feasible, with some suggestions for improvement (see section 5.2).

There are three limitations to this study we want to discuss. First, this is only a pre-test of a BP GLI service concept. Although it helps that several respondents have previous BP *Challenge* experience and that all respondents have GLI experience, we are still in the design phase. Hence, this is not a true test of market adoption. Second, given the exploratory nature of our study, we only user-tested with $n=7$ respondents (see Method section). We foresee that a second design and user-test iteration will be needed to further refine the service concept and improve adoption. Still, in the current design exploration, we benefitted a lot from the diversity of their backgrounds (physiotherapists, dietitians and lifestyle coaches) and GLI experiences. Third, regarding adoption, other factors are important too (like market dynamics, regulatory changes, other stakeholder interests etc). So, this study is limited in scope since it focusses mostly on attractiveness and feasibility for potential adopters.

5.1 Implications for theory

Firstly, given the health care context and the fact that funding tariffs are fixed, as well as many of the rules, protocols and obligations, there is a ***special kind of cost-benefit assessment*** for health practice owners. Questions like ‘Can we be efficient?’ and ‘How much work are we required to do?’ are ***closely linked to ‘What is the quality of the referrals*** of clients from Physician Assistants?’ If this referral quality is low (e.g. the wrong target group; too complex patients with too many other problems; not the right motivation or expectations) then the drop-out ratio becomes too high which also stops the funding for these clients and ruins the business case for the practice owner. Besides, quality of care is compromised, which goes against professional pride and standards of practice (hampering diffusion factor alignment/compatibility).

Secondly, intervention ***attractiveness*** has two faces. Besides the business case attractiveness for the ***practice owner*** previously mentioned, there is a second question of attractiveness: for the ***lifestyle coach*** that will execute the intervention. For the coach the following factors and questions are generally important: Will my clients become happy (with this type of biofeedback and coaching, with the results, with the lessons learned)? Do I learn new things, and can I grow my competence

level? Do I get a nice balance between supporting materials/best practices versus options for customization (factor 6 that was added to Rogers' factors)? Again, *alignment* with professional norms and ways of working is important.

5.2 Implications for practice & service redesign lessons

To increase attractiveness and feasibility, the following service redesign suggestions followed from the user study:

- Communication materials to help raise awareness and attract high-quality client referrals from Family Physician practices.
- Explicit cooperation with heart foundation (Hartstichting) to aid awareness and connect to existing local 'heart check' initiatives and local care networks.
- Support for the first start-up group for a new BP GLI adopter ("there are always start-up issues that need solving") & for complex BP questions that a new BP GLI adopter runs into.
- Yearly repeat trainings only 1 half-day mandatory.
- More frequent workshops (e.g. monthly) in maintenance year 2.
- WhatsApp group (or other social media) for 2-year client support and retention.
- Workshop schedule (2-year) for adopters: which workshops/exercise are mandatory and where is room for customization?

Next steps we are taking towards national upscaling are: implementing longer term support (+1,5 years) and evaluating its effectiveness, testing with different target-/risk-groups like perimenopausal women, extending needs assessments of health practice owners, and training other health practice owners for BP GLI execution and evaluating health effectiveness as well as BP GLI attractiveness.

5.3 Conclusion

The Dutch GLI systems appears supportive to 'crossing the upscaling chasm' for health prevention interventions. And on a user validation level of the Blood Pressure GLI redesign, based on feedback from the potential adoption practitioners, they see a clear potential for a blood pressure-oriented GLI. In their assessments, the greatest

opportunities lie in the tangibility of the results; the greatest threats lie in recruitment (efficiency and effectiveness) and maintaining participant retention over the full two-year period.

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